拒絶理由通知書

特許出願の番号	特願２００３－０７７３６１
起案日	平成２１年　１月１４日
特許庁審査官	石坂　博明　　３８６８　５Ｄ００
特許出願人代理人	大石　皓一（外　３名）　様
適用条文	第２９条第２項、第３６条

この出願は、次の理由によって拒絶をすべきものです。これについて意見がありましたら、この通知書の発送の日から６０日以内に意見書を提出してください。

理　由

Ａ．この出願の下記の請求項に係る発明は、その出願前に日本国内又は外国において、頒布された下記の刊行物に記載された発明又は電気通信回線を通じて公衆に利用可能となった発明に基いて、その出願前にその発明の属する技術の分野における通常の知識を有する者が容易に発明をすることができたものであるから、特許法第２９条第２項の規定により特許を受けることができない。

Ｂ．この出願は、特許請求の範囲の記載が下記の点で、特許法第３６条第６項第２号に規定する要件を満たしていない。

記　　（引用文献等については引用文献等一覧参照）

［理由Ａ］

請求項：１－５、８－９
引用文献：１－５
備考：
引用文献１、２、３に記載されているように、２層の記録層を合金化することで記録する光記録媒体であって、基板と反対側から光を入射する構造のものは周知である。

引用文献３、４には合金化させる記録層の材料の組み合わせとして、請求項１－５、８－９に記載された記録層の材料を用いることが記載されている。
本願発明はＣｕを主成分とする層を基板側に配置するものである。しかし、本

願明細書表２には、Ｃｕと組み合わせる金属としてＧｅ、Ｓｎ、Ａｌを用いた場合に、Ｃｕを主成分とする層を基板側に配置すると、Ｃｕを主成分とする層を保護層側に配置する場合よりもＣ／Ｎが悪化することが示されている。よって、Ｃｕと組み合わせる金属としてＧｅ、Ｓｎ、Ａｌを用いた場合に、Ｃｕを主成分とする層を基板側に配置する点に技術的意義を見出せないから、この点は当業者が適宜なし得ると判断する。

さらに引用文献５（段落００１５、段落００２０、段落００３０、段落００３４等）には、記録層の積層順序を好適化してＣ／Ｎ比を改善することが記載されている。従って、Ｓｉ、Ｍｇを選択したとしても、Ｃｕを主成分とする層を基板側に配置することは当業者が容易になし得る。

引用文献４（段落００２５－段落００２８、段落００８３、段落００８４等）に記載されているように、元素を添加して安定化させることは周知技術である。

請求項：６－７
引用文献：１－７
備考：
引用文献６、７に記載されているように、合金化記録層を有する媒体に反射層、誘電体層を設けることは周知である。

[理由Ｂ]

請求項１には「第二の記録層」が「前記第一の記録層に近傍に位置し」と記載されているが、下記の点が不明確である。
（１）「近傍に位置し」という記載では、「第一の記録層」と「第二の記録層」に別々の情報が記録される場合が含まれ、２つの記録層を合金化して記録する光記録媒体に係る発明である点が明確でない。
（２）「記録層に近傍に位置し」とは、日本語の文章としておかしなものである。（「記録層の近傍に位置し」の誤記であると考えている。）

引　用　文　献　等　一　覧

~~１.特開２００１－２９１２７３号公報~~
~~２.特開昭５８－２２０７９４号公報~~
~~３.特開昭６０－２２６０３９号公報~~
~~４.特開平０５－１６９８１９号公報~~
５.実開平４－８９３７４号公報
~~６.特開平９－６６６６９号公報~~
~~７.特開平１０－２２６１７３号公報~~

＜先行技術文献調査結果の記録＞

・調査した技術分野

G11B7/24

この先行技術文献調査結果の記録は、拒絶理由を構成するものではありません。

この拒絶理由通知の内容に関するお問い合わせは下記連絡先にお願い致します。

連絡先　特許審査第四部情報記録　　渡部　博樹
電話　　０３－３５８１－１１０１　　内線　３５４９
ＦＡＸ　０３－３５８０－６９０６

(19)日本国特許庁（ＪＰ）　(12) **公開実用新案公報**（Ｕ）　(11)実用新案出願公開番号

実開平4－89374

(43)公開日　平成４年(1992)８月４日

(51)Int.Cl.[5]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｂ４１Ｍ　5/26				
Ｇ１１Ｂ　7/24	Ｂ	7215－5D		
	Ａ	7215－5D		
Ｇ１１Ｃ　13/04		2116－5L		
		8305－2H	Ｂ４１Ｍ　5／26	Ｘ

審査請求　有　（全 3 頁）

(21)出願番号　実願平3－7929
特願昭59－14058の変更

(22)出願日　昭和59年(1984)１月28日

(71)出願人　000003078
株式会社東芝
神奈川県川崎市幸区堀川町72番地

(71)出願人　000220985
東芝インテリジエントテクノロジ株式会社
神奈川県川崎市幸区柳町70番地

(72)考案者　高岡　隆
神奈川県川崎市幸区柳町70番地　東芝インテリジエントテクノロジ株式会社内

(72)考案者　小屋原　悟
神奈川県川崎市幸区柳町70番地　東芝インテリジエントテクノロジ株式会社内

(74)代理人　弁理士　鈴江　武彦

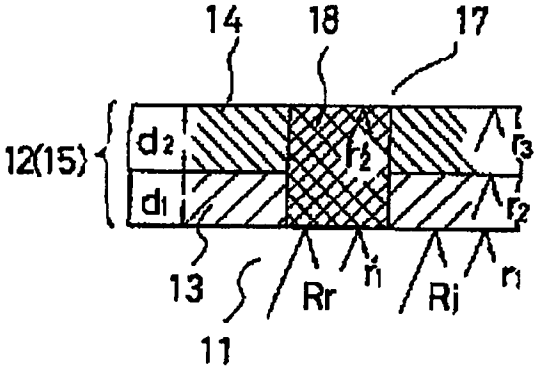
最終頁に続く

(54)【考案の名称】　光ディスク

(57)【要約】

【目的】ビームの照射部に形状変化を生じせしめることなく、光学特性の顕著な変化を作り出して情報の記録が行なえる光ディスクを提供することである。

【構成】基体11と、この基体11上に第１の光学的消衰係数を有し第１の反射率で光を反射するＧｅ，Ｔｅ，Ｂｉ，Ｔｌ，Ｔｌおよびこれらを主成分とする合金から構成される第１の薄膜13と、この第１の薄膜13上に前記第１の光学的消衰係数より大なる第２の光学的消衰係数を有し前記第１の反射率より大なる第２の反射率で光を反射するＴｅ，Ｂｉ，Ｓｎ，Ａｕ，Ｓｂ，Ａｇ，Ａｌ，Ｉｎおよびこれらを主成分とする合金から構成され前記第１の薄膜13を構成する材料の１種と共通する材料を含む第２の薄膜14とを具備してなり、光が照射されることにより前記第１の薄膜13と第２の薄膜14とが相互拡散し単一層に変化するようにしたものである。



1

【実用新案登録請求の範囲】

【請求項1】　基体と、この基体上に第1の光学的消衰係数を有し第1の反射率で光を反射するGe，Te，Bi，Tl，Tlおよびこれらを主成分とする合金から構成される第1の記録層と、この第1の記録層上に前記第1の光学的消衰係数より大なる第2の光学的消衰係数を有し前記第1の反射率より大なる第2の反射率で光を反射するTe，Bi，Sn，Au，Sb，Ag，Al，Inおよびこれらを主成分とする合金から構成され前記第1の記録層を構成する材料の1種と共通する材料を含む第2の記録層と、を具備してなり、光が照射されることにより前記第1の記録層と第2の記録層とが相互拡散し単一層に変化することを特徴とする光ディスク。

【図面の簡単な説明】

【図1】第1の従来例を示す説明図。

【図2】第2の従来例を示す説明図。

2

【図3】第3の従来例を示す説明図。

【図4】本考案の一実施例を示す断面図。

【図5】同実施例の要部を示す作用説明図。

【図6】記録層の構成の相違による記録効果を説明するための光学特性図。

【図7】記録層の構成の相違による記録効果を説明するための光学特性図。

【図8】第1の他の実施例のを示す断面図。

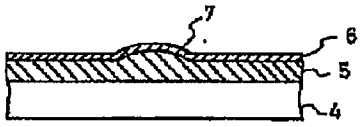
【図9】第2の他の実施例のを示す断面図。

【図10】第3の他の実施例のを示す断面図。

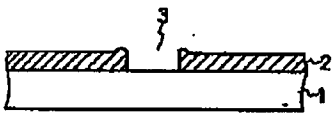
【符号の説明】

11…基板（基体）、12…記録層部、13…第1の薄膜（第1の記録層）、14…第2の薄膜（第2の記録層）、16…レーザービーム、18…単一薄膜、14，23…保護層、21…接着剤、22…下地層。

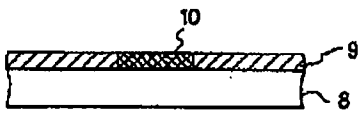
【図1】



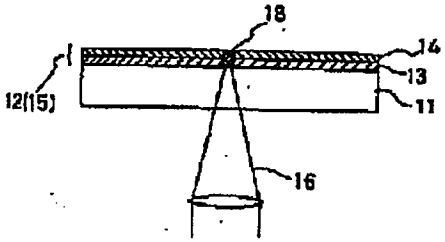
【図2】



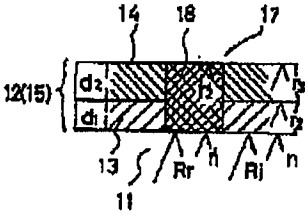
【図3】



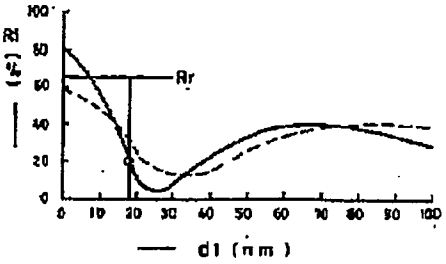
【図4】



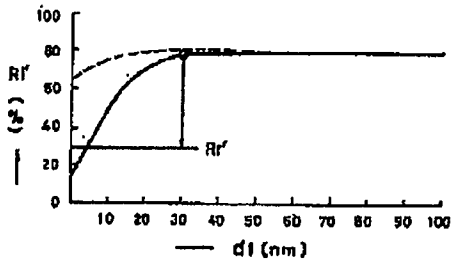
【図5】



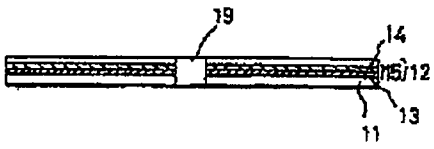
【図6】



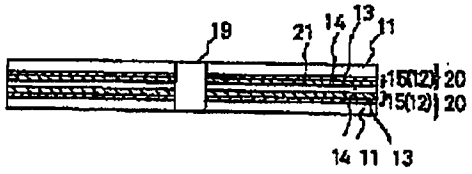
【図7】



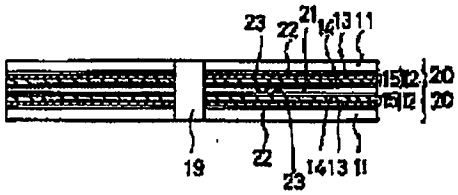
【図8】



【図9】



【図10】



フロントページの続き

(72)考案者　斉藤　哲男
神奈川県川崎市幸区柳町70番地　株式会社
東芝柳町工場内

【考案の詳細な説明】

【０００１】

【産業上の利用分野】

本考案は、レーザービームによりヒートモード記録が行なえる光ディスクに関する。

【０００２】

【従来の技術】

従来、用いられているメモリ用光ディスクの記録形態は、図１～図３に示す３種のタイプに分類される。

【０００３】

図１に示すタイプは、基板１上に形成した低融点材料の薄膜２をレーザービームのスポットで照射することにより、薄膜の局部に融解・蒸発を生じさせ、微小な穴３として記録させるものである。

【０００４】

また、図２に示すタイプは基板４に２層の薄膜５，６を形成し、レーザービームのスポットで照射したとき、温度が上昇した下地層としての薄膜５から気泡を発生させ、上の薄膜６にふくらみ７として記録させるものである。

【０００５】

また、図３に示すタイプは基板８上に温度変化で組織の変化する薄膜９を形成し、レーザービームのスポットで照射した薄膜９の局部１０を例えば結晶質から非結晶質へと反射率のことなる組織に変化させることで記録させるものである。

なお、これらの他にも公知例として関連あるものに、特公昭５４－２０１３６号と特公昭５４－２０１３７号およびＡｐｐｌ．Ｐｈｙｓ．Ｌｅｔｔ．３９　９２７（１９８１）等がある。

【０００６】

これらの記録部は、いずれも無記録部との間に光の透過または反射の特性に違いを生じることから、レーザービームを用い記録の有無を検出することで読み出される。

【０００７】

【考案が解決しようとする課題】

しかしながら、これらの従来技術のうち、図１および図２に示すタイプは、記録に際して記録膜の蒸発や形状変化を伴うので、記録膜の上に保護膜を直接形成すると記録感度が大きく低下するという欠点があり、実用するには記録膜から離して保護板を設けた、いわゆるエヤーサンドイッチ構造にしなければならないという欠点があった。

【０００８】

また、図３に示すタイプは、保護膜を記録膜上に形成しても大きな感度低下はないが、薄膜の組織変化を利用しているため、記録部と無記録部との協力が不安定であり、記録寿命が短いという欠点があった。

【０００９】

本考案は、上記実情に基づいてなされたもので、その目的とするところは、ビームの照射部に形状変化を生じせしめることなく、光学特性の顕著な変化を作り出して情報の記録が行なえる光ディスクを提供することである。

【００１０】

【課題を解決するための手段】

本考案は、上記課題を解決するために、基体と、この基体上に第１の光学的消衰係数を有し第１の反射率で光を反射するＧｅ，Ｔｅ，Ｂｉ，Ｔｌ，Ｔｉおよびこれらを主成分とする合金から構成される第１の記録層と、この第１の記録層上に前記第１の光学的消衰係数より大なる第２の光学的消衰係数を有し前記第１の反射率より大なる第２の反射率で光を反射するＴｅ，Ｂｉ，Ｓｎ，Ａｕ，Ｓｂ，Ａｇ，Ａｌ，Ｉｎおよびこれらを主成分とする合金から構成され前記第１の記録層を構成する材料の１種と共通する材料を含む第２の記録層とを具備してなり、光が照射されることにより前記第１の記録層と第２の記録層とが相互拡散し単一層に変化するようにしたものである。

【００１１】

【作用】

上記構成とすることにより、光学的消衰係数に基づいて第１および第２の記録層を選択することにより、光を照射した後の記録層部の反射率を設定することが

でき、ビームの照射部に形状変化を生じせしめることなく、光学特性の顕著な変化を作り出して情報の記録が行なえるものである。

【００１２】

【実施例】

以下、本考案の一実施例を図面を参照しながら説明する。図４において、１１は例えば透明の基体としての基板であり、この基板１１上には記録層部１２が設けられている。

【００１３】

そして、この記録層部１２は光学的消衰係数の異なる第１，第２の記録層としての２種の薄膜１３，１４からなる記録層１５で構成されている。すなわち、この記録層１５は複素屈折率$n_1 - ik_1$を有する第１の薄膜１３および複素屈折率$n_2 - ik_2$を有する第２の薄膜１４で構成される。

【００１４】

しかして、記録のスレッショルド値以上の強度を持ったレーザービーム１６を照射する前の、このような記録層１５（記録層部１２）の初期率Ｒ　は、図５に示すように、基板１１と第１の薄膜１３との境界、第１の薄膜１３と第２の薄膜１４との境界および第２の薄膜１４と外界１７との境界の３つの境界で生じるフレネル反射係数r_1，r_2およびr_3のベクトル和で算出される。

【００１５】

それぞれフレネル反射係数のベクトル長と、それらの間に生じる位相差は第１の薄膜１３および第２の薄膜１４の複素屈折率とそれらの厚さd_1およびd_2によって主に決められる。したがって、初期反射率Ｒ　は第１と第２の薄膜１３，１４の材料とその厚さd_1およびd_2を選定することにより所望する値にすることができる。

【００１６】

このように選定した初期反射率Ｒ　をもつ記録層１５は、第１と第２の薄膜１３，１４の材料の加熱された時の相互拡散係数で決まる記録のスレッショルド値以上の強度をもったレーザービーム１６でスポット照射すると、その部分の第１と第２の薄膜１３，１４は相互に拡散してその境界を消滅し新しい単一薄膜１８

を生成する。

【００１７】

その結果、フレネル反射係数r_2は失われ、その記録を行なった部分の反射率Ｒ　は生成された単一薄膜１８の複素屈折率による両境界でのフレネル反射係数r'_1とr'_3だけのベクトル合成された値に非可逆的に変化する。すなわち、本考案のメモリ用光ディスクの記録は、上記の機構に基づき記録層１５の反射率をＲ　からＲ　に変換することで行なうものである。

【００１８】

ところで、このような記録層１５には記録に要するレーザービームのスレッショルド値が低いこと、反射率Ｒ　とＲ　の比が大きいこと、および室温で第１と第２の薄膜１３，１４間に相互拡散が生じないこと、言い換えるならば記録層１５として高感度であり、読み出し信号が大きく、しかも長期に亘って安定であることが要求される。

【００１９】

それらの要求を満たす膜構成の一例として、複素屈折率が５．３－ｉ０．８のＧｃと２．１－ｉ７．１のＡｌを用いた場合のd_1と反射率Ｒ　との関係を図６と図７に示す。

【００２０】

図６は反射率Ｒ　＜ｒ　とするためにそれらの複素屈折率の虚数項である消衰係数ｋの関係を$k_1 < k_2$とした場合で、第１の薄膜１３をＧｅ、第２の薄膜１４をＡｌで構成した記録層１５であり、実線および点線はＡｌ膜（第２の薄膜１４）の厚さをそれぞれ４０ｎｍおよび２０ｎｍとしたときのＧｅ膜厚（第１の薄膜１３）と反射率Ｒ　の関係を示す。

【００２１】

なお、実線にはＧｅ膜の厚さを１７．５ｎｍにしたときの反射率Ｒ　からＲ　への変化の例を矢印で印してある。図７は反射率Ｒ′　＞Ｒ′　とするために$k_1 > k_2$の関係とした場合で、第１の薄膜１３をＡｌ、第２の薄膜１４をＧｅで構成した記録層１５のＡｌ膜（第１の薄膜１３）の厚さと反射率Ｒ′　の関係を示した。

【００２２】

図中の実践と点線はそれぞれＧｅ膜（第２の薄膜１４）の厚さを８０ｎｍと４０ｎｍにした場合であり、実線にはＡｌ膜の厚さを３０ｎｍとしたときの反射率Ｒ′　からＲ′　への変化の例を示してある。

【００２３】

なお、本考案は上記実施例に限定されず、例えば図８～図１０に示すように構成してもよい。

【００２４】

すなわち、図８に示す実施例では、基板１１は中心穴１９を有する円板上に形成され、また、記録層部１２は記録層１５を保護するためにその記録層１５上に保護層２０を形成して構成されている。

【００２５】

そして、記録は基板１１側から情報を持ったスレッショルド値以上の強度のレーザービーム１６で記録層１５にスポット照射し、その局部の温度を上昇させ、第１と第２の薄膜１３，１４が相互に拡散しその局部を２層膜の記録層１５と大きく反射率のちがう単一薄膜１８に非可逆的に変換することで行なわれる。この記録した情報はその反射率のちがうスレッショルド以下の強度にしたレーザービームのスポットで検出することにより読み出される。

【００２６】

また、図９に示す実施例では、基板１１上に薄膜１３，１４からなる記録層１５（記録層部１２）を形成した２枚の片面型メモリ用光ディスク２０を接着剤２１により接着して両面型メモリ用様光ディスクとした構成となっている。

【００２７】

さらに、図１０に示す実施例では、基板１１の表面欠陥を改質するために先ず下地層２２を形成してから記録層１５を形成し、ついで接着工程における記録層１５の損傷を防止するため記録層２０上に表面保護コーティング２３を形成して記録層部１２を構成したのち、それらの２枚を接着剤２１で接着して両面型メモリ用光ディスクとした構成となっている。

【００２８】

以上のように、記録層１５を２種の薄膜１３，１４で構成し、レーザービーム１６のスポットで加熱したときその局部に膜材料の相互拡散を生じせしめ単一薄膜（単一層）１８に変換することで記録を可能としたため、記録に際して穴をあけたり、ふくらみを作るなどの形状変化を生じることがない。

【００２９】

したがって、記録層１５上に密着させて保護層２０，２３を形成したり、接着剤２１で貼り合わせても記録感度のほとんど低下しない効果があり、安価で取り扱いの便利な形状のメモリ用光ディスクを提供できる。さらに、記録は２層膜を単一層に非可逆的に変換することで達成するため、記録形態は非常に安定であり、長期保存に十分耐えることができる。

【００３０】

また、図６のような初期反射率の低い膜構成はレーザービームの利用効率が高く、さらに明るいスポットとして記録されるため、読み出し動作のとき記録層１５のピンホールや基板１１の傷など暗い欠陥から発生するパルス雑音と記録スポットからの信号を分離することが容易で、信号と雑音の比を高くできる効果がある。

【００３１】

なお、上記実施例においては、小さな消衰係数をもった材料としてＧｅを、大きな消衰係数をもつ材料としてＡｌを用いた場合について記述したが、本考案の作用・効果はこれらの材料だけに限定されるものではない。本考案のような作用・効果が十分に得られる材料の組み合わせは、消衰係数ｋの比が１．５以上で高温での相互拡散係数の大きな少なくとも２種以上の材料を薄膜として用いた多くの場合について可能である。

【００３２】

すなわち、ｋの小さな材料には、Ｇｅ，Ｔｅ，Ｂｉ，Ｔｌ，Ｔｉおよびそれらを主成分とする合金などが用いられ。これらにｋの大きな材料としてＴｅ，Ｂｉ，Ｓｎ，Ａｕ，Ｓｂ，Ａｇ，Ａｌ，Ｉｎおよびそれらを主成分とする合金などがあり、これらを組み合わせて少なくとも２層以上の膜としてもよい。

【００３３】

【考案の効果】

以上説明したように本考案は、基体と、この基体上に第１の光学的消衰係数を有し第１の反射率で光を反射するＧｅ，Ｔｅ，Ｂｉ，Ｔｌ，Ｔｉおよびこれらを主成分とする合金から構成される第１の記録層と、この第１の記録層上に前記第１の光学的消衰係数より大なる第２の光学的消衰係数を有し前記第１の反射率より大なる第２の反射率で光を反射するＴｅ，Ｂｉ，Ｓｎ，Ａｕ，Ｓｂ，Ａｇ，Ａｌ，Ｉｎおよびこれらを主成分とする合金から構成され前記第１の記録層を構成する材料の１種と共通する材料を含む第２の記録層とを具備してなり、光が照射されることにより前記第１の記録層と第２の記録層とが相互拡散し単一層に変化するようにしたものである。

【００３４】

したがって、光学的消衰係数に基づいて第１および第２の記録層を選択することにより、光を照射した後の記録層部の反射率を設定することができ、ビームの照射部に形状変化を生じせしめることなく、光学特性の顕著な変化を作り出して情報の記録が行なえる等の優れた効果を奏する。

JP 4-89374
Machine Translation

CLAIMS

[The scope of a claim for utility model registration]
[Claim 1]The 1st recording layer that comprises an alloy which makes the main ingredients germanium, Te, Bi, Tl, Ti, and these which have the 1st optical extinction coefficient and reflect light with the 1st reflectance on a base and this base, Comprise an alloy which has the 2nd optical extinction coefficient as for which size becomes from said 1st optical extinction coefficient, and makes the main ingredients Te, Bi, Sn, Au, Sb, Ag, aluminum and In which reflect light with the 2nd reflectance as for which size becomes, and these from said 1st reflectance at this 1st recording layer top, and said 1st recording layer. An optical disc providing the 2nd recording layer containing material which is common in one sort of material to constitute, and said 1st recording layer and the 2nd recording layer carrying out counter diffusion by irradiating light, and changing to a monolayer.

DETAILED DESCRIPTION

[Detailed explanation of the device]
[0001]
[Industrial Application]This design is related with the optical disc which can perform heat mode record by a laser beam.
[0002]
[Description of the Prior Art]Conventionally, the recording form of the optical disc for memories used is classified into three sorts of types shown in drawing 1 - drawing 3.
[0003]The type shown in drawing 1 makes the part of a thin film produce fusion and evaporation, and is made to record as the minute hole 3 by irradiating with the thin film 2 of the low melting point materials formed on the substrate 1 at the spot of a laser beam.
[0004]When the two-layer thin films 5 and 6 are formed in the substrate 4 and it is irradiated at the spot of a laser beam, the type shown in drawing 2 generates air bubbles from the thin film 5 as a foundation layer in which temperature rose, swells to the upper thin film 6, and is made to record as 7.
[0005]the part 10 of the thin film 9 with which the type shown in drawing 3 formed the thin film 9 from which an organization changes by a temperature change on the substrate 8, and it irradiated at the spot of the laser beam -- for example, the amorphous from a crystalline substance -- reflectance -- things -- it is made to record by changing an organization It is JP,54-20136,B, JP,54-20137,B, and Appl.Phys.Lett.39 to what [other than these] is related as a well-known example. There is 927 (1981) etc.
[0006]Since each of these Records Department produces a difference in the penetration of light, or the reflective characteristic among the non-Records Department, it is read by detecting the existence of record using a laser beam.
[0007]

[Problem(s) to be Solved by the Device]However, the type shown in drawing 1 and drawing 2 among such conventional technologies, Since it was accompanied by evaporation and the shape change of record film when recording, there was a fault which separated from record film and formed the guard plate for there being a fault that recording sensitivity falls greatly when a protective film is directly formed on record film, and using that it had to be made what is called EYA sandwich structure.
[0008]Even if the type shown in drawing 3 formed the protective film on record film, there was no big sensitivity lowering, but since organization change of a thin film was used, there was a fault that cooperation with the Records Department and the non-Records Department was unstable, and a record life was short.
[0009]The place which this design was made based on the above-mentioned actual condition, and is made into the purpose is providing the optical disc which makes a remarkable change of an optical property and can record information without producing and cheating out of a shape change to the irradiation part of a beam.
[0010]
[Means for Solving the Problem]The 1st recording layer that comprises an alloy which makes the main ingredients germanium, Te, Bi, Tl, Ti, and these which have the 1st optical extinction coefficient and reflect light with the 1st reflectance on a base and this base in order that this design may solve an aforementioned problem, Comprise an alloy which has the 2nd optical extinction coefficient as for which size becomes from said 1st optical extinction coefficient, and makes the main ingredients Te, Bi, Sn, Au, Sb, Ag, aluminum and In which reflect light with the 2nd reflectance as for which size becomes, and these from said 1st reflectance at this 1st recording layer top, and said 1st recording layer. The 2nd recording layer containing material which is common in one sort of material to constitute is provided, and said 1st recording layer and the 2nd recording layer carry out counter diffusion, and it is made to change to a monolayer by irradiating light.
[0011]
[Function]By choosing the 1st and 2nd recording layers by having the above-mentioned composition based on an optical extinction coefficient, The reflectance of the recording layer part after irradiating with light can be set up, without producing and cheating out of a shape change to the irradiation part of a beam, a remarkable change of an optical property is made and information can be recorded.
[0012]
[Example]Hereafter, one example of this design is described, referring to drawings. In drawing 4, 11 is a substrate as a base of transparence and the recording layer part 12 is formed on this substrate 11.
[0013]And this recording layer part 12 comprises the recording layer 15 which consists of two sorts of thin films 13 and 14 as the 1st and 2nd recording layer in which optical extinction coefficients differ. That is, this recording layer 15 comprises the 2nd thin film 14 that has 1st thin film 13 and complex-index-of-refraction n_2-ik_2 which has complex-index-of-refraction n_1-ik_1.
[0014]Such rate of primary stage R_i of the recording layer 15 (recording layer part 12) before irradiating with the laser beam 16 which carried out the deer and had the intensity more than the threshold level value of record, As shown in drawing 5, it is computed by the vector sum of Fresnel reflection coefficient r_1 produced on three boundaries, the boundary of the substrate 11 and the 1st thin film 13, the boundary of the 1st thin film 13

and the 2nd thin film 14, and the boundary of the 2nd thin film 14 and the external world 17, r_2, and r_3.

[0015]The phase contrast produced among them with the vector length of a Fresnel reflection coefficient, respectively is mainly determined by the complex indices of refraction, those thickness d_1, and d_2 of the 1st thin film 13 and the 2nd thin film 14. Therefore, initial reflectivity R_i can be made into the value for which it asks by selecting the 1st, the material and thickness d_1 of the 2nd thin film 13 and 14, and d_2.

[0016]The recording layer 15 with initial reflectivity R_i selected in this way, If spot irradiation is carried out by the laser beam 16 with the intensity more than the threshold level value of the record decided by an interdiffusion coefficient when the material of the 1st and the 2nd thin film 13 and 14 is heated, the 1st and the 2nd thin film 13 and 14 of the portion will be diffused mutually, will disappear the boundary, and will generate the new single thin film 18.

[0017]As a result, Fresnel reflection coefficient r_2 is lost and reflectance R_r of a portion which performed the record changes to the value by which vector composition only of Fresnel reflection coefficient r'_1 in both the boundaries by the complex index of refraction of the generated single thin film 18 and the r'_3 was carried out irreversibly. That is, record of the optical disc for memories of this design is performed by changing the reflectance of the recording layer 15 into R_r from R_i based on the above-mentioned mechanism.

[0018]By the way, to such a recording layer 15, the threshold level value of the laser beam which record takes is low, It is required that the ratio of reflectance R_i to R_r is large and that counter diffusion does not arise between the 1st and the 2nd thin film 13 and 14 at a room temperature, and that it will be high sensitivity as the recording layer 15 if it puts in another way, and it should be large and it should be [in which a read signal moreover continues at a long period of time] stable.

[0019]As an example of film constitution which fills those demands, the relation between d_1 when a complex index of refraction uses germanium of 5.3-i0.8 and aluminum of 2.1-i7.1, and reflectance R_i is shown in drawing 6 and drawing 7.

[0020]By the case where the relation of the extinction coefficient k which is an imaginary number paragraph of those complex indices of refraction in order that drawing 6 may consider it as reflectance $R_i<r_r$ is made into $k_1<k_2$. It is the recording layer 15 which constituted the 1st thin film 13 from germanium, and constituted the 2nd thin film 14 from aluminum, and a solid line and a dotted line show germanium thickness (the 1st thin film 13) when the thickness of an Al film (the 2nd thin film 14) is 40 nm and 20 nm, respectively, and the relation of reflectance R_i.

[0021]The example of the change to R_r when the thickness of germanium film is 17.5 nm from reflectance R_i is marked on the solid line by the arrow. In order that drawing 7 might consider it as reflectance $R'_i>R'_r$, the thickness of the Al film (the 1st thin film 13) of the recording layer 15 and the relation of reflectance R'_i which constituted the 1st thin film 13 from aluminum, and constituted the 2nd thin film 14 from a case where it is considered as the relation of $k_1>k_2$, in germanium were shown.

[0022]The practice in a figure and a dotted line are the cases where the thickness of germanium film (the 2nd thin film 14) is 80 nm and 40 nm, respectively, and the example of the change to R'_r when the thickness of an Al film is 30 nm from reflectance R'_i is shown in the solid line.

[0023]This design may be constituted, as it is not limited to the above-mentioned

example, for example, is shown in drawing 8 - drawing 10.
[0024]That is, the substrate 11 is formed on the disk which has the center hole 19, and in order to protect the recording layer 15, the recording layer part 12 forms the protective layer 20 on the recording layer 15, and comprises an example shown in drawing 8.
[0025]And spot irradiation of the record is carried out to the recording layer 15 by the laser beam 16 of the intensity more than the threshold level value which had information from the substrate 11 side, The temperature of the part is raised, the 1st and the 2nd thin film 13 and 14 are spread mutually, and it is carried out by changing the part into the single thin film 18 with which reflectance is greatly different from the recording layer 15 of a two-layer film irreversibly. This recorded information is read by detecting at the spot of a laser beam made into the intensity below the threshold level from which that reflectance is different.
[0026]In the example shown in drawing 9, it has composition which pasted up the optical disc 20 for two one side type memories in which the recording layer 15 (recording layer part 12) which consists of the thin films 13 and 14 was formed on the substrate 11, with the adhesives 21, and was used as the he optical disc for both-sides type memories.
[0027]In order to reform [the example shown in drawing 10] the surface discontinuity of the substrate 11, after forming the foundation layer 22 first, the recording layer 15 is formed, Subsequently, in order to prevent damage to the recording layer 15 in a bonding process, after forming the surface-protection coating 23 on the recording layer 20 and constituting the recording layer part 12, it has composition which pasted up those two sheets with the adhesives 21, and was used as the optical disc for both-sides type memories.
[0028]As mentioned above, by producing and cheating out of the counter diffusion of the charge of a film material on the part, and changing into the single thin film (monolayer) 18, when the recording layer 15 is constituted from two sorts of thin films 13 and 14 and it heats at the spot of the laser beam 16, record is written as it is possible, A shape change, such as making a hole when recording or making a swelling, is not produced.
[0029]Therefore, it is made to stick on the recording layer 15, and is effective in recording sensitivity hardly falling, even if the protective layers 20 and 23 are formed or it pastes together with the adhesives 21, and it is cheap and the optical disc for memories of the convenient shape of handling can be provided. Since record is attained by changing a two-layer film into a monolayer irreversibly, the recording form is dramatically stable and can be equal to a mothball enough.
[0030]Since the film constitution with low initial reflectivity like drawing 6 is recorded as a spot whose utilization efficiency of a laser beam is high still brighter, It is easy to separate the signal from pulse noise and a record spot generated from dark defects, such as a pinhole of the recording layer 15 and a crack of the substrate 11, at the time of read operation, and it is effective in the ability to make the ratio of a signal to noise high.
[0031]In the above-mentioned example, although the case where aluminum was used as a material with a small extinction coefficient as a material which has a big extinction coefficient for germanium was described, an operation and effect of this design are not limited only to such materials. The ratio of the extinction coefficient k is possible for the combination of the material in which the operation and an effect like this design are fully acquired about the case of many using at least two or more sorts of materials with a big interdiffusion coefficient in an elevated temperature or more at 1.5 as a thin film.

[0032]That is, the alloy etc. which make the main ingredients germanium, Te, Bi, Tl, Ti, and them are used for a small material of k. Among these are the alloy etc. which make the main ingredients Te, Bi, Sn, Au, Sb, Ag, aluminum, In, and them as a big material of k, and it is good also as a film more than two-layer at least combining these.
[0033]
[Effect of the Device]The 1st recording layer that comprises an alloy in which this design makes the main ingredients germanium, Te, Bi, Tl, Ti, and these which have the 1st optical extinction coefficient and reflect light with the 1st reflectance on a base and this base as explained above, Comprise an alloy which has the 2nd optical extinction coefficient as for which size becomes from said 1st optical extinction coefficient, and makes the main ingredients Te, Bi, Sn, Au, Sb, Ag, aluminum and In which reflect light with the 2nd reflectance as for which size becomes, and these from said 1st reflectance at this 1st recording layer top, and said 1st recording layer. The 2nd recording layer containing the material which is common in one sort of the material to constitute is provided, and said 1st recording layer and the 2nd recording layer carry out counter diffusion, and it is made to change to a monolayer by irradiating light.
[0034]Therefore, by choosing the 1st and 2nd recording layers based on an optical extinction coefficient, The reflectance of the recording layer part after irradiating with light can be set up, without producing and cheating out of a shape change to the irradiation part of a beam, a remarkable change of an optical property is made and the outstanding effect, like information is recordable is done so.

TECHNICAL FIELD

[Industrial Application]This design is related with the optical disc which can perform heat mode record by a laser beam.

PRIOR ART

[Description of the Prior Art]Conventionally, the recording form of the optical disc for memories used is classified into three sorts of types shown in drawing 1 - drawing 3.
[0003]The type shown in drawing 1 makes the part of a thin film produce fusion and evaporation, and is made to record as the minute hole 3 by irradiating with the thin film 2 of the low melting point materials formed on the substrate 1 at the spot of a laser beam.
[0004]When the two-layer thin films 5 and 6 are formed in the substrate 4 and it is irradiated at the spot of a laser beam, the type shown in drawing 2 generates air bubbles from the thin film 5 as a foundation layer in which temperature rose, swells to the upper thin film 6, and is made to record as 7.
[0005]the part 10 of the thin film 9 with which the type shown in drawing 3 formed the thin film 9 from which an organization changes by a temperature change on the substrate 8, and it irradiated at the spot of the laser beam -- for example, the amorphous from a crystalline substance -- reflectance -- things -- it is made to record by changing an organization It is JP,54-20136,B, JP,54-20137,B, and Appl.Phys.Lett.39 to what [other than these] is related as a well-known example. There is 927 (1981) etc.

[0006]Since each of these Records Department produces a difference in the penetration of light, or the reflective characteristic among the non-Records Department, it is read by detecting the existence of record using a laser beam.

EFFECT OF THE INVENTION

[Effect of the Device]The 1st recording layer that comprises an alloy in which this design makes the main ingredients germanium, Te, Bi, Tl, Ti, and these which have the 1st optical extinction coefficient and reflect light with the 1st reflectance on a base and this base as explained above, Comprise an alloy which has the 2nd optical extinction coefficient as for which size becomes from said 1st optical extinction coefficient, and makes the main ingredients Te, Bi, Sn, Au, Sb, Ag, aluminum and In which reflect light with the 2nd reflectance as for which size becomes, and these from said 1st reflectance at this 1st recording layer top, and said 1st recording layer. The 2nd recording layer containing the material which is common in one sort of the material to constitute is provided, and said 1st recording layer and the 2nd recording layer carry out counter diffusion, and it is made to change to a monolayer by irradiating light.
[0034]Therefore, by choosing the 1st and 2nd recording layers based on an optical extinction coefficient, The reflectance of the recording layer part after irradiating with light can be set up, without producing and cheating out of a shape change to the irradiation part of a beam, a remarkable change of an optical property is made and the outstanding effect, like information is recordable is done so.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Device]However, the type shown in drawing 1 and drawing 2 among such conventional technologies, Since it was accompanied by evaporation and the shape change of record film when recording, there was a fault which separated from record film and formed the guard plate for there being a fault that recording sensitivity falls greatly when a protective film is directly formed on record film, and using that it had to be made what is called EYA sandwich structure.
[0008]Even if the type shown in drawing 3 formed the protective film on record film, there was no big sensitivity lowering, but since organization change of a thin film was used, there was a fault that cooperation with the Records Department and the non-Records Department was unstable, and a record life was short.
[0009]The place which this design was made based on the above-mentioned actual condition, and is made into the purpose is providing the optical disc which makes a remarkable change of an optical property and can record information without producing and cheating out of a shape change to the irradiation part of a beam.

MEANS

[Means for Solving the Problem]The 1st recording layer that comprises an alloy which makes the main ingredients germanium, Te, Bi, Tl, Ti, and these which have the 1st optical extinction coefficient and reflect light with the 1st reflectance on a base and this base in order that this design may solve an aforementioned problem, Comprise an alloy which has the 2nd optical extinction coefficient as for which size becomes from said 1st optical extinction coefficient, and makes the main ingredients Te, Bi, Sn, Au, Sb, Ag, aluminum and In which reflect light with the 2nd reflectance as for which size becomes, and these from said 1st reflectance at this 1st recording layer top, and said 1st recording layer. The 2nd recording layer containing material which is common in one sort of material to constitute is provided, and said 1st recording layer and the 2nd recording layer carry out counter diffusion, and it is made to change to a monolayer by irradiating light.

OPERATION

[Function]By choosing the 1st and 2nd recording layers by having the above-mentioned composition based on an optical extinction coefficient, The reflectance of the recording layer part after irradiating with light can be set up, without producing and cheating out of a shape change to the irradiation part of a beam, a remarkable change of an optical property is made and information can be recorded.

EXAMPLE

[Example]Hereafter, one example of this design is described, referring to drawings. In drawing 4, 11 is a substrate as a base of transparence and the recording layer part 12 is formed on this substrate 11.

[0013]And this recording layer part 12 comprises the recording layer 15 which consists of two sorts of thin films 13 and 14 as the 1st and 2nd recording layer in which optical extinction coefficients differ. That is, this recording layer 15 comprises the 2nd thin film 14 that has 1st thin film 13 and complex-index-of-refraction n_2-ik_2 which has complex-index-of-refraction n_1-ik_1.

[0014]Such rate of primary stage R_i of the recording layer 15 (recording layer part 12) before irradiating with the laser beam 16 which carried out the deer and had the intensity more than the threshold level value of record, As shown in drawing 5, it is computed by the vector sum of Fresnel reflection coefficient r_1 produced on three boundaries, the boundary of the substrate 11 and the 1st thin film 13, the boundary of the 1st thin film 13 and the 2nd thin film 14, and the boundary of the 2nd thin film 14 and the external world 17, r_2, and r_3.

[0015]The phase contrast produced among them with the vector length of a Fresnel reflection coefficient, respectively is mainly determined by the complex indices of refraction, those thickness d_1, and d_2 of the 1st thin film 13 and the 2nd thin film 14. Therefore, initial reflectivity R_i can be made into the value for which it asks by selecting the 1st, the material and thickness d_1 of the 2nd thin film 13 and 14, and d_2.

[0016]The recording layer 15 with initial reflectivity R_i selected in this way, If spot irradiation is carried out by the laser beam 16 with the intensity more than the threshold

level value of the record decided by an interdiffusion coefficient when the material of the 1st and the 2nd thin film 13 and 14 is heated, the 1st and the 2nd thin film 13 and 14 of the portion will be diffused mutually, will disappear the boundary, and will generate the new single thin film 18.

[0017]As a result, Fresnel reflection coefficient r_2 is lost and reflectance R_r of a portion which performed the record changes to the value by which vector composition only of Fresnel reflection coefficient r'_1 in both the boundaries by the complex index of refraction of the generated single thin film 18 and the r'_3 was carried out irreversibly. That is, record of the optical disc for memories of this design is performed by changing the reflectance of the recording layer 15 into R_r from R_i based on the above-mentioned mechanism.

[0018]By the way, to such a recording layer 15, the threshold level value of the laser beam which record takes is low, It is required that the ratio of reflectance R_i to R_r is large and that counter diffusion does not arise between the 1st and the 2nd thin film 13 and 14 at a room temperature, and that it will be high sensitivity as the recording layer 15 if it puts in another way, and it should be large and it should be [in which a read signal moreover continues at a long period of time] stable.

[0019]As an example of film constitution which fills those demands, the relation between d_1 when a complex index of refraction uses germanium of 5.3-i0.8 and aluminum of 2.1-i7.1, and reflectance R_i is shown in drawing 6 and drawing 7.

[0020]By the case where the relation of the extinction coefficient k which is an imaginary number paragraph of those complex indices of refraction in order that drawing 6 may consider it as reflectance $R_i<r_r$ is made into $k_1<k_2$. It is the recording layer 15 which constituted the 1st thin film 13 from germanium, and constituted the 2nd thin film 14 from aluminum, and a solid line and a dotted line show germanium thickness (the 1st thin film 13) when the thickness of an Al film (the 2nd thin film 14) is 40 nm and 20 nm, respectively, and the relation of reflectance R_i.

[0021]The example of the change to R_r when the thickness of germanium film is 17.5 nm from reflectance R_i is marked on the solid line by the arrow. In order that drawing 7 might consider it as reflectance $R'_i>R'_r$, the thickness of the Al film (the 1st thin film 13) of the recording layer 15 and the relation of reflectance R'_i which constituted the 1st thin film 13 from aluminum, and constituted the 2nd thin film 14 from a case where it is considered as the relation of $k_1>k_2$, in germanium were shown.

[0022]The practice in a figure and a dotted line are the cases where the thickness of germanium film (the 2nd thin film 14) is 80 nm and 40 nm, respectively, and the example of the change to R'_r when the thickness of an Al film is 30 nm from reflectance R'_i is shown in the solid line.

[0023]This design may be constituted, as it is not limited to the above-mentioned example, for example, is shown in drawing 8 - drawing 10.

[0024]That is, the substrate 11 is formed on the disk which has the center hole 19, and in order to protect the recording layer 15, the recording layer part 12 forms the protective layer 20 on the recording layer 15, and comprises an example shown in drawing 8.

[0025]And spot irradiation of the record is carried out to the recording layer 15 by the laser beam 16 of the intensity more than the threshold level value which had information from the substrate 11 side, The temperature of the part is raised, the 1st and the 2nd thin film 13 and 14 are spread mutually, and it is carried out by changing the part into the single thin film 18 with which reflectance is greatly different from the recording layer 15

of a two-layer film irreversibly. This recorded information is read by detecting at the spot of a laser beam made into the intensity below the threshold level from which that reflectance is different.

[0026]In the example shown in drawing 9, it has composition which pasted up the optical disc 20 for two one side type memories in which the recording layer 15 (recording layer part 12) which consists of the thin films 13 and 14 was formed on the substrate 11, with the adhesives 21, and was used as the he optical disc for both-sides type memories.

[0027]In order to reform [the example shown in drawing 10] the surface discontinuity of the substrate 11, after forming the foundation layer 22 first, the recording layer 15 is formed, Subsequently, in order to prevent damage to the recording layer 15 in a bonding process, after forming the surface-protection coating 23 on the recording layer 20 and constituting the recording layer part 12, it has composition which pasted up those two sheets with the adhesives 21, and was used as the optical disc for both-sides type memories.

[0028]As mentioned above, by producing and cheating out of the counter diffusion of the charge of a film material on the part, and changing into the single thin film (monolayer) 18, when the recording layer 15 is constituted from two sorts of thin films 13 and 14 and it heats at the spot of the laser beam 16, record is written as it is possible, A shape change, such as making a hole when recording or making a swelling, is not produced.

[0029]Therefore, it is made to stick on the recording layer 15, and is effective in recording sensitivity hardly falling, even if the protective layers 20 and 23 are formed or it pastes together with the adhesives 21, and it is cheap and the optical disc for memories of the convenient shape of handling can be provided. Since record is attained by changing a two-layer film into a monolayer irreversibly, the recording form is dramatically stable and can be equal to a mothball enough.

[0030]Since the film constitution with low initial reflectivity like drawing 6 is recorded as a spot whose utilization efficiency of a laser beam is high still brighter, It is easy to separate the signal from pulse noise and a record spot generated from dark defects, such as a pinhole of the recording layer 15 and a crack of the substrate 11, at the time of read operation, and it is effective in the ability to make the ratio of a signal to noise high.

[0031]In the above-mentioned example, although the case where aluminum was used as a material with a small extinction coefficient as a material which has a big extinction coefficient for germanium was described, an operation and effect of this design are not limited only to such materials. The ratio of the extinction coefficient k is possible for the combination of the material in which the operation and an effect like this design are fully acquired about the case of many using at least two or more sorts of materials with a big interdiffusion coefficient in an elevated temperature or more at 1.5 as a thin film.

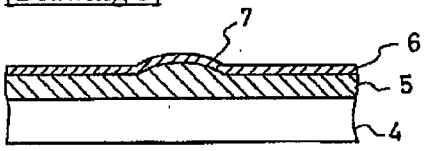
[0032]That is, the alloy etc. which make the main ingredients germanium, Te, Bi, Tl, Ti, and them are used for a small material of k. Among these are the alloy etc. which make the main ingredients Te, Bi, Sn, Au, Sb, Ag, aluminum, In, and them as a big material of k, and it is good also as a film more than two-layer at least combining these.

DESCRIPTION OF DRAWINGS

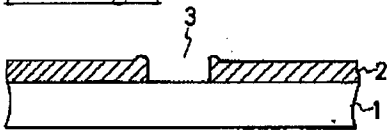
[Brief Description of the Drawings]
[Drawing 1]The explanatory view showing the 1st conventional example.
[Drawing 2]The explanatory view showing the 2nd conventional example.
[Drawing 3]The explanatory view showing the 3rd conventional example.
[Drawing 4]The sectional view showing one example of this design.
[Drawing 5]The operation explanatory view showing the important section of the example.
[Drawing 6]The optical property figure for explaining the record effect by difference of the composition of a recording layer.
[Drawing 7]The optical property figure for explaining the record effect by difference of the composition of a recording layer.
[Drawing 8]The sectional view showing that of other 1st example.
[Drawing 9]The sectional view showing that of other 2nd example.
[Drawing 10]The sectional view showing that of other 3rd example.
[Description of Notations]
11 [-- The 2nd thin film (the 2nd recording layer), 16 / -- A laser beam, 18 / -- A single thin film, 14, 23 / -- A protective layer, 21 / -- Adhesives, 22 / -- Foundation layer.] -- A substrate (base), 12 -- A recording layer part, 13 -- The 1st thin film (the 1st recording layer), 14

DRAWINGS

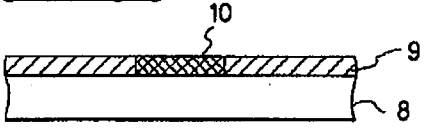
[Drawing 1]



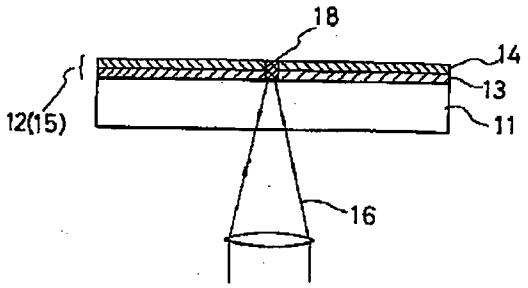
[Drawing 2]



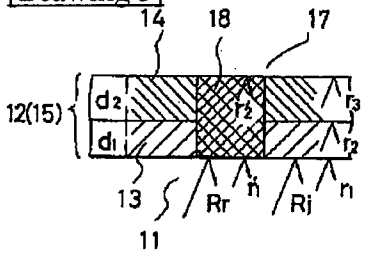
[Drawing 3]



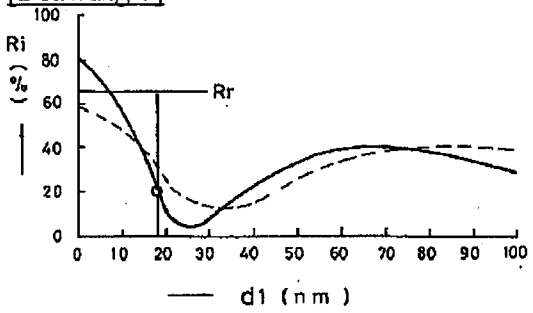
[Drawing 4]



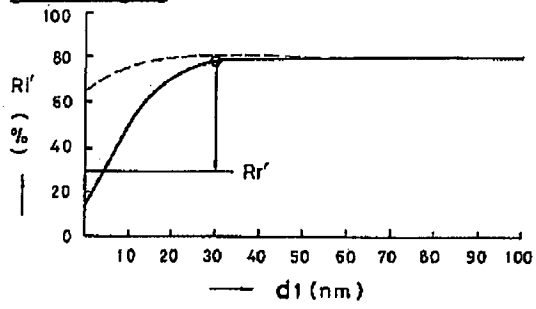
[Drawing 5]



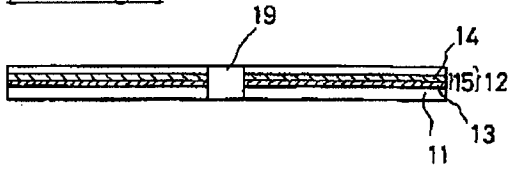
[Drawing 6]



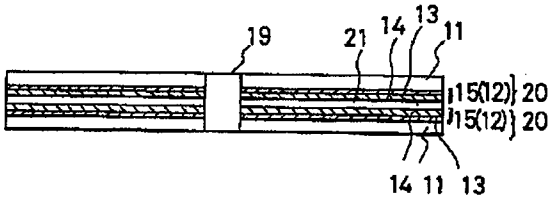
[Drawing 7]



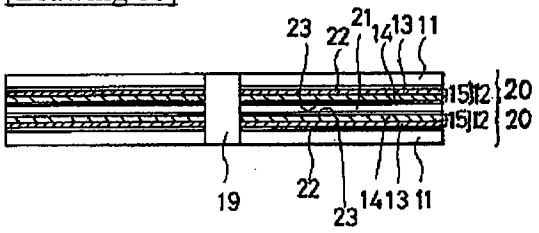
[Drawing 8]



[Drawing 9]


19
21
14
13
11
15(12)
20
15(12)
20
14
11
13

[Drawing 10]


23
22
21
14
13
11
15
12
20
15
12
20
19
22
23
14
13
11